

Section 2 Acceptance of Manufactured Material and Sampling Methods

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6-201 General

This section describes Caltrans procedures for acceptance of manufactured material. This section also describes the types of materials that are considered “manufactured material” and the guidelines for sampling these materials.

6-201 General

6-202 Responsibilities and Procedures for Acceptance of Materials

The following describes the responsibilities and procedures for acceptance of materials:

6-202 Responsibilities and Procedures for Acceptance of Materials

6-202A The Contractor

The contractor must provide sufficient advance notification to the resident engineer on source and location of materials to be tested so that the work will not be delayed. As required in Section 6, “Control of Materials,” of the *Standard Specifications*, the contractor must list all sources of materials and the location at which these materials are available for inspection on Form CEM-3101, “Notice of Materials to Be Used,” prior to being used on the project.

Before use for Caltrans projects, plant scales and meters must have a current certification. For additional details, see Section 3-903E, “Weighing and Metering Procedures,” of the *Construction Manual* (manual).

Aggregate sources must comply with the Surface Mining and Reclamation Act of 1975 (SMARA). Mining operations determined to be in compliance are listed on the AB 3098 SMARA Eligible List. This list can be obtained from the Division of Construction or at the Department of Conservation’s web site at <http://www.consrv.ca.gov/omr/SMARA/3098-list>. Refer to Chapter 7, “Environmental,” of this manual for further information on SMARA requirements.

Specifications for welded products usually require the fabricator to have an acceptable welding quality control plan prior to manufacturing any products for Caltrans. For details on welding quality control plans refer to the Section 180, “Welding,” of the *Bridge Construction Records and Procedures Manual*, Volume II.

6-202B Office of Materials Engineering and Testing Services

The Office of Materials Engineering and Testing Services (METS) assigns personnel for inspection of materials at the source of supply. This includes all materials listed in Table 6-2.1, “Materials Accepted by Resident Engineer” at the end of this section.

METS assigns the responsibility for making the inspection based on information contained on Form CEM-3101. Offices in Sacramento, the San Francisco Bay Area, or Los Angeles conduct most of the inspections. However, METS may assign the inspection to the district materials engineer, the resident engineer, or a commercial laboratory.

6-202B (1) *Source Inspection*

METS must receive all necessary information for source inspection. Forward all copies of approved shop drawings without established distributions (for example, buildings or other small structures) as well as notification of approvals (such as paint color) or changes in the work (such as design changes or contract change orders) to METS. METS should receive copies of all correspondence with contractors or suppliers that may affect fabrication or manufacture.

Inspection by METS includes sampling and testing as necessary to ensure compliance with test requirements and dimensional requirements. Complex fabrication, as in the case of precast, prestressed concrete members and structural steel, also require inspection during fabrication. Inspected materials meeting specifications are identified with a lot number. The METS inspector enters the lot number, a description and the quantities of materials inspected on Form TL-0029, "Report of Inspection of Material."

6-202B (2) *Assignment to a Unit of METS or a District Materials Laboratory*

After receiving the Form CEM-3101 from the resident engineer, METS indicates on the Form CEM-3101 the items in need of inspection and assigns the inspection to the appropriate inspection office. The responsible inspection office then prepares Form TL-0608, "Notice of Materials to be Furnished," and sends it to the contractor or supplier and the resident engineer.

Subsequently, the inspection office inspects the material, and if acceptable, identifies it with Form TL-0624, "Inspection Release Tag." If the material does not comply, METS or the district materials laboratory will send a "non-conformance report" to the resident engineer.

For acceptable material, a completed copy of Form TL-0029 is sent to the resident engineer.

The resident engineer does not normally receive this report until after the materials have arrived at the job site, but it should be checked against the identifying information that was attached to, or marked on, the materials.

The resident engineer must inform the assigned inspection office if the Form TL-0029 is not received within 15 days after receipt of materials or if there are discrepancies so the necessary investigation can be made.

6-202B (3) *Form TL-0624, "Inspection Release Tag."*

Materials covered by a Form TL-0624, "Inspection Release Tag," should arrive at the job site properly identified. Form TL-0624 shows the identifying lot number, the inspector's initials, and the date of inspection. If the item is one that does not lend itself to the attaching of tags, such as reinforced concrete pipe, the inspector marks the lot number on each separate piece. In some instances, when there is a possibility of losing tags, the inspector both attaches tags and marks a lot number on the pieces. Timber products typically are stamped with a brand on each piece, usually at the end where it can be seen. (Caltrans inspectors use a stamp with the letters CHC or CT. Commercial laboratories use their own identifying initials or symbols.)

Laboratory inspectors will not necessarily tag every bundle or piece in a shipment (with the exception of timber and reinforced concrete pipe). However, the inspector must attach enough tags on a load to give reasonable assurance that the tags represent the entire shipment.

When manufactured products arrive on the project, the attached Forms TL-0624 authorize the resident engineer to permit use of the materials. However, inspect the materials for damage during shipping or storage, general workmanship, and conformance to planned shape or dimensions.

The METS inspector (or the district laboratory inspector) collects the required certificates of compliance for materials inspected at the source.

6-202B (4) Assignment to a Commercial Laboratory

Commercial laboratories perform most out-of-state inspections. This requires an agreement between METS and the commercial laboratory.

METS authorizes out-of-state inspections only for critical fabricated and manufactured materials and where, in the opinion of the resident engineer and METS, it is in Caltrans' best interest to do so. METS assigns inspection to commercial laboratories.

The assigned laboratory inspects, identifies and tags the material. A commercial laboratory does not use Form TL-0029. They do make a report, usually in letter form, and submit this to METS. METS forwards a copy to the resident engineer.

Materials covered by a letter from a commercial laboratory must arrive at the job site properly identified.

6-202B (5) Assignment to the Resident Engineer.

METS may assign inspection of products for which they normally have responsibility back to the resident engineer. The resident engineer will release these materials at the jobsite using Form CEM-4102, "Material Inspected and Released on Job." See Section 6-3, "Field Tests," of this manual for details. METS assigns inspection responsibility to the resident engineer using Form TL-0028, "Notice of Materials to be Inspected."

After being assigned inspection responsibility, the resident engineer may accept material on the basis of required certificates of compliance or sampling and testing and visual inspection.

When material will be accepted and released at the job site by use of a Certificate of Compliance, the required certificates of compliance should accompany the material to the job site and be retained in the project files. Sampling of material is in accordance with the data shown in the tables at the end of section 6-1, "Sample Types and Frequencies," of this manual.

The resident engineer should inform the contractor that the material will be sampled and inspected on the job and that sufficient time must be allowed to complete any necessary testing before the material can be used.

6-202C The District

The responsibility for training and certifying materials testers rests with the district materials engineer.

6-202D The Resident Engineer

The resident engineer must ensure that only sampled, tested and inspected materials meeting the contract requirements enter the work. The resident engineer must also ensure production facilities, such as asphalt plants and concrete plants, meet specifications. Request the assistance of the district weights and measure coordinator for inspecting asphalt concrete and portland cement concrete plants as required by the specifications and California Test 109, "Method for Testing of Weighing and Measuring Devices."

The resident engineer must ensure that the contractor submits a Form CEM-3101, "Notice of Materials to Be Used" for all materials that require inspection. If the contractor does not submit a Form CEM-3101 before the preconstruction conference, provide a list of materials that may require listing on the CEM-3101 to the contractor during this conference. If the sources of all material are not known, the contractor may submit a partial list and submit supplements as soon as other sources are known.

A timely, accurate, and complete Form CEM-3101 can prevent future delays and conflicts. The following data must be included:

- The Caltrans contract number and the contract item or items for which the material will be used. If the contractor uses a project number (different from the Caltrans number) it helps to also include this number.
- The name, address and telephone number of the supplier or manufacturer where the material can be inspected.
- If the source of material is out-of-state also include the name, address and telephone number of the contractor or subcontractor placing the order and the order number.

Check the form for the required information. If the Form CEM-3101 is incomplete, require that it is corrected or supplemented before distributing the copies. Send METS a copy promptly. METS will make the required assignments for inspection as noted above under "Office of Materials Engineering and Testing Services." Distribute other copies as required by the district.

On the basis of information contained on the Form CEM-3101, the resident engineer will identify (based on district policy) the appropriate samplers, testers and inspectors. The following is a partial list of those who may need to be notified:

- District or METS staff who will be obtaining samples and performing tests on each material
- District or METS staff who will be obtaining samples for each material accepted on the basis of a Certificate of Compliance (Normally tested by METS)
- The district weights and measures coordinator to inspect or witness California Test 109. The district weights and measures coordinator maintains a list of material plants currently in compliance with California Test 109.

6-202D (1) Inspection Verification

If the material delivered to the job site lacks proper identification, or the report of inspection is unconfirmed, or the acceptability of the material is questionable, do not allow materials to be incorporated in the work until they have been found to comply with the specifications. Contact the assigned inspection unit to verify testing or submit samples for new acceptance tests. The exception is sampling of paint. Paint must be sampled at the job site even if there is evidence of previous inspection.

6-202D (2) Source Inspection

The resident engineer and METS share the responsibility for inspection of materials at the source. However, the resident engineer has the sole responsibility for acceptance of material. For example:

- The material may be damaged in shipment or installation.

- It is not always practical for METS to make a 100% piece-by-piece inspection. The inspection is usually random sampling. The resident engineer or assistant resident engineer should check for visually detectable defects or damage.
- There are other situations over which the METS inspector has little control. For example:
 1. A given size of metal culvert pipe may vary in required thickness at various locations with different fill heights. METS inspectors cannot guarantee that a given piece of pipe will be placed at the proper location. They can only check the pipe for specified markings and determine that the measurement is within tolerance for the indicated thickness.
 2. Fit of band couplers should also be checked at the job site.
 3. Some contracts require special wall thickness of reinforced concrete pipe at certain locations, the pipe may be furnished from several plants, and the METS inspector would not know the specific job site location of that particular pipe. The inspector can only determine that it fits one of the types specified.
 4. Another situation not controllable by inspection at the source is the transfer of materials from one contract to another. The inspector can confirm (by a copy of the original inspection report) that a given amount of material with a given lot number was inspected for the first contract. Identifying the material as that received on the first job under the original inspection report and monitoring its transfer from one job to another are responsibilities of the resident engineers involved.

Such transfers should not be allowed unless the material is positively identified or is of a type (such as fencing or reinforcing steel) that can be resampled and retested in the event identification is lost or is questionable.

- The specifications may be difficult to interpret or the inspector is not aware of a contract change order.

The tables at the end of this section list products that are usually inspected at the site of manufacture or fabrication and indicate items that are checked by the inspector at the source and those which must be checked or rechecked at the job site. The table does not cover every item but provides typical examples.

6-202E Materials Accepted on the Basis of a "Certificate of Compliance"

In accordance with Section 6-1.07, "Certificates of Compliance," of the *Standard Specifications*, the engineer may permit the use of certain materials before sampling and testing if accompanied by a Certificate of Compliance.

Certificates of compliance are used for products for which the industry has demonstrated a high degree of reliability in meeting specifications. METS is responsible for monitoring these industries. METS notifies districts when material from any producer is not acceptable on the basis of a Certificate of Compliance. The district must notify affected contractors. Certificates of compliance must contain the following information:

- Name of mill and company.
- Date of shipment.
- Quantity shipped.

- Serial number traceable to a specific silo, bin or lot.
- A statement naming the applicable type and brand, and that the materials meet the requirements of the *Standard Specifications*, the special provisions, or both.
- Contract number.
- Signature of responsible officer of the company.

When material delivered with a Certificate of Compliance is improperly certified, or any part of it is found not to comply with specifications, reject the entire shipment and notify METS immediately. Procedures for sampling and testing materials accepted by certification vary depending on the material. Following are some details covering the sampling of materials that are accepted by certification.

6-202E (1) Bituminous Materials

When asphalt arrives at the job site or at the plant accompanied by a Certificate of Compliance, the resident engineer may accept the shipment for use before sampling and testing.

All samples of asphalt, along with the necessary forms and tickets, are sent to Engineering Services, Office of Materials Engineering and Testing Services, 5900 Folsom Boulevard, Sacramento, California 95819. Ship sample cans, two at a time, in the cardboard cartons used for shipping samples of the completed mix. Take samples in the amount and frequency shown in the tables in Section 6-1, "Sample Types and Frequencies," of this manual.

Sample asphalts in accordance with California Test 125, "Methods for Sampling Highway Materials and Products Used in the Roadway Structural Sections." Review the safety and health portion of California Test 125 before sampling asphalts.

After obtaining a sample from a plant storage tank, write the shipment number on Form TL-0101, "Sample Identification Card."

METS sends test results to the district materials engineer and to the resident engineer.

6-202E (2) Asphalt Rubber Latex Joint Filler

Submit samples in one-liter friction top cans. Sample after the contents of the drum have been stirred thoroughly and brought to a uniform consistency and before the setting powder has been added.

Note the batch number and the shipment number on Form TL-0101.

6-202E (3) Two-component Joint Sealing Compounds

This material is usually in 10-liter pails. Each pail requires a manufacturer's lot number. Before sampling, stir thoroughly. Samples should be taken in the amount and frequency shown in the tables in Section 6-1, "Sample Types and Frequencies," of this manual.

6-202E (4) Portland Cement

For cement delivered directly to the work by the manufacturer, require one Certificate of Compliance for each shipment.

A single certificate for each brand may certify the cement used in ready-mixed concrete by the vendor of the concrete, to cover all deliveries in a single day. It must show:

- The name or brand of cement,
- Mill source
- The total number of cubic meters of concrete delivered under the certificate
- A complete list of individual deliveries identified by delivery slip number or other suitable identification.

A single certificate may cover all deliveries of precast products in a single lot. It must show the name or brand of cement and the length of each size of pipe or the number of precast units of other types represented.

METS inspects precast products, including pipe, made at a plant other than that of the contractors at the jobsite. When such inspection is complete, the resident engineer is relieved of responsibility for obtaining certificates of compliance and sampling of cement. The inspector at the precast product plant will handle cement inspection approximately as outlined for ready-mixed concrete.

Certificates of compliance for cement are inspected and filed by the resident engineer. In the event of a cement test failure, forward copies of certificates to METS.

Sample cement in accordance with the frequencies shown in Section 6-1, "Sample Types and Frequencies," of this manual and in accordance with California Test 125, "Sampling Highway Materials and Products Used in the Roadway Structural Sections."

Where plant facilities include a cement auger, the cement samples may be obtained by a pipe-sleeve sampling device or by any other convenient method.

A full 3.5-kg is sampled at one time, not in smaller increments. Close the bag immediately, leaving room for the cement to shift. Place the sealed bag in a second plastic bag with the white copy of Form TL-0518, "Job Cement Samples Record." The Form TL-0518 should show the Certificate of Compliance serial number, cement brand and type, name of mill or vendor, date, time sampled, and contract number.

Box the cement samples, after identification, in corrugated cartons (designed to hold single 3.5 kg samples) or in concrete cylinder cartons, which will hold six samples. Ship no more than six samples in any one container.

Mark the shipping carton "Cement Sample," and ship it to METS.

Test reports of portland cement are issued by METS. Acceptability of current shipments from the mill will be shown on the report, but the reports may not actually include results of samples taken from a specific project. The test reports, however, are applicable to each contract identified on a test report. When a project has special requirements for cement, or if there are other non-routine conditions, submit special samples with instructions that they be tested and reported for the specific project.

6-202E (5) Reinforcement

See Section 4-52, "Reinforcement", of this manual for details.

6-202E (6) Signing and Delineation Materials

The Certificate of Compliance must be as specified in the special provisions for prequalified and tested signing and delineation materials.

After obtaining written confirmation of product approval from the district traffic engineer, the resident engineer may accept a substitute signing or delineation material or product without a Certificate of Compliance.

6-202E (7) Required Attachments for Acceptance

The materials listed in Table 6-2.1, “Materials Accepted by Resident Engineer,” may arrive on the job site without inspection and Form TL-0029, “Report of Inspection of Material.” If required by the *Standard Specifications* or the special provisions, ensure that these materials have a Certificate of Compliance. The table is divided into two parts:

1. Materials that can be accepted solely on the basis of a Certificate of Compliance and
2. Materials that require a test report from the manufacturer or supplier along with the Certificate of Compliance.

Table 6-2.1 Materials Accepted by Resident Engineer

Accept on Certificate of Compliance Only	Accept on Certificate of Compliance and Additional Back-Up*
Asbestos cement pipe Asbestos sheet packing Brick Cast iron pipe Cast iron manhole rings and covers Ceramic tile Clay products, manufactured Copper pipe Culvert markers Drain tile Drip irrigation line Electrical conductor Electrical conduit (galvanized and plastic) Electrical pull boxes (concrete and plastic) Electrical service cabinets Expansion joint filler Gates Glass beads Guide markers Plastic pipe Precast raised traffic bars Reinforcing steel Sheet metal Slotted edge drain Snow poles Irrigation hose Styrofoam filler Waterproofing fabric Waterstop	Barbed wire Chain-link fencing and railing Crash cushions Crop inlet grates and frames Fence posts Guard rail Open steel flooring and grating Precast concrete manhole sections Steel sheet piling Timber products (treated and untreated) Welded wire fabric Wire mesh fencing

*Additional back-up documentation such as mill test reports for steel, pressure treating reports for timber, and concrete test reports that show the materials comply to specifications.

6-203 Materials Manufactured to Caltrans-Specified Formulation

The *Standard Specifications* require that certain products be manufactured to Caltrans specifications. The most common of these are paint, curing compounds for portland cement concrete, and epoxy.

6-203A Paint

Paint manufactured under Caltrans specifications is sampled at the factory, tested by METS and identified by lot numbers before shipment is made to the project.

After paint is inspected and identified by METS, sample all paint in the field and send the samples to the laboratory for testing in accordance with the frequency shown in Section 6-1, “Sample Types and Frequencies,” of this manual.

For bridges and other major structures, do not allow the paint to be used until the test results of field samples are available. For other miscellaneous painting, properly inspected and identified paint may be used pending test results.

Send samples of paint from the field to the laboratory as soon as the paint is received on the project. This is to determine if the paint has degraded since METS inspected it. During the progress of the job, take special check samples when the paint exhibits hard settling, if the resident engineer suspects tampering with the paint, or at any other time at the discretion of the resident engineer.

Proper sampling to obtain a representative portion of the paint is absolutely mandatory. Use the following sampling methods:

- For bridges and other major structures, or whenever large quantities are involved, send an unopened 20-L can to METS. METS will return unused portions to the job.
- For smaller samples:
 1. Pour the top liquid into a clean container as large as the one being sampled.
 2. Stir the settled portion of the paint with a paddle, gradually reincorporating the decanted liquid a little at a time until all has been added.
 3. “Box” the paint by pouring it back and forth between the two containers at least five or six times or until the paint is mixed thoroughly.
 4. Take a liter sample immediately.

Send all samples to the laboratory promptly, along with all pertinent information regarding them. Use Form TL-0101, “Sample Identification Card.”

When the paint is state-furnished, check samples will not be required.

6-203B Concrete Curing Compounds

Concrete curing compounds are generally of two types, petroleum hydrocarbon resin base or water base. Curing compounds are normally sampled at the factory, tested by METS, and identified by lot numbers before they are shipped to the project.

METS does not routinely inspect the petroleum hydrocarbon resin base concrete curing compound at the source. It may be accepted for use if it is packaged and labeled as specified. However, sample it for testing in accordance with the frequency shown in Section 6-1, “Sample Types and Frequencies,” of this manual.

6-203 Materials Manufactured to Caltrans-Specified Formulation

In addition to requirements in California Test 125, “Methods for Sampling Highway Materials and Products Used in the Roadway Structural Sections,” field samples may be obtained from a valve in the feed or recirculation lines of the sprayer. Samples may be obtained from the spray nozzles if care is used to prevent excessive loss of the solvent by evaporation. Because of the tendency of pigments to settle, all pigmented types must be mixed thoroughly before sampling.

6-203C Epoxy

METS samples epoxy manufactured under Caltrans specifications at the factory, tests and identifies it by lot numbers before it is shipped to the project. The Certificate of Compliance required for epoxy certifies compliance with packaging and labeling laws, not quality of material. The source inspector normally obtains the certificate, and it does not need to accompany the material to the job site.

Normally, it is not necessary to sample epoxy in the field if the material has been inspected at the source and is identified properly.

Occasionally, specified composition of the above materials is changed. The newer specification results in an equal or better product, or an acceptable replacement for a product is no longer available. Materials manufactured under specifications newer than those that apply to a particular project are acceptable for use. METS inspectors release such materials, and resident engineers may permit use of such materials without contract change orders unless specifically advised to the contrary. This applies only to the items of paint and epoxy identified properly by Caltrans specification numbers. Current specification numbers are listed in the special provisions.

6-203D Unprocessed Soils and Aggregates

The following discussion is primarily applicable to initial sampling and sampling performed for reasons other than specification compliance although the same precautions apply when sampling for specification compliance.

6-203D (1) Stone from Ledges and Quarries

Inspect the ledge or quarry face to determine any variations in different strata, and in different portions of the ledge. Observe and record differences in color and structure. Obtain separate samples of unweathered stone from all strata that appear to vary in color and structure.

6-203D (2) Material Sites of Sand, Gravel, or Soil

Select samples representing the different materials that are available in the deposit. If the deposit is worked as an open face or pit, take the samples by channeling the face so that they will represent material that visual inspection indicates may be used. It is necessary, especially in small deposits, to excavate test holes some distance back of, and parallel to, the face to determine the extent of the supply. The number and depth of these test holes depend on the quantity of material to be used from the deposit. Obtain samples from open test pits by channeling a face of the test pit in the same manner as sampling a face of a materials site, described above. Do not include in the sample material that will be stripped from the pit as overburden. Obtain separate samples from the face of the bank and from the test holes. If visual inspection indicates that there is considerable variation in the material, obtain separate samples at different depths.

Sample deposits that have no open faces by means of test holes. When sampling material sites, select depth and spacing of test holes considering the probable method of operating the pit. In general, dozers will combine the material laterally. A shovel will remove the material vertically. Test results in a “spotty” pit may be misleading to the extent that operations may be too expensive in order to make the required grading.

If at all possible, use a dozer or shovel to open up the pit before sampling rather than depending on test holes.

6-203E Processed Aggregates

Sample processed aggregates, from locations such as stockpiles, transportation units, conveyors, or windrows in accordance with California Test 125, “Sampling Highway Materials and Products Used in the Roadway Structural Sections.”

Table 6-2.2 Inspection of Fabricated and Manufactured Materials (1 of 3)

PRODUCT	ITEMS TESTED BY METS	ITEMS TO CHECK AT JOB SITE
Asphalt plank	Tests workmanship and dimensions	Workmanship and dimensions
Bolts and nuts	Tests, visual spot-check, marking. Spot-check galvanized high strength (ASTM A 325) nuts for proper lubricant	Visible defects, dimensions, threads, galvanizing, marking for correct type fit of nuts. Make sure high-strength bolts and nuts are used where specified and nuts are lubricated properly. (See Office of Structure Construction Records and Procedures.)
Ceramic tile	Tests, visual inspection in stack.	Damage, defects, dimensions
Casting, iron and steel, bronze	Material tests, visual and dimensional inspection	Dimensions, fillets, unauthorized repairs (welds fillers), defects
Clay pipe and drain tile	Tests, visual inspection, dimensions, marking	Damage, cracks and other defects, marking, straightness.
Concrete pipe	Tests, visual inspection, dimensions, elliptical steel markings	Damage, defects, exposed steel, dimensions, specific locations per plans), straightness, concentricity.
Corrugated metal pipe and structural plate pipe	Check mechanical tests, check coating tests, metal thickness (as marked), workmanship, diameter, etc. (spot-check), markings	Damage, visible defects, damaged galvanizing proper metal thickness for specific location, damage to bituminous coating. Check for weld defects, spacing and edge distance of rivets or spot welds, fit or bands, etc.
Curing compound (Chlorinated rubber type)	Material tests, marking. (Other types accepted at jobsite if properly packaged and labeled).	Proper mixing, marking, check sample. Check for specified type of container and correct marking.
Elastomeric bearing pads	Specifies tests, visual and dimensional inspection certification	Damage, defects, uniformity, dimensions
Electrical items, luminaries, controllers, signal heads, conductors, etc.	Controllers - complete tests and inspection Luminaries - random tests, visual inspection Signal heads, switches, etc. - visual inspection plans, type, operational check, etc. Conductors - random tests	Shipping damage, defects, conformance to plans, type, operational check, etc. Check loop detectors for operation under field conditions inspection. See that all conductors are correct type and size.
Epoxy	Specified tests, markings, packaging	Proper material for intended use, excessive thickening or crystallization, proper mixing
Expanded polystyrene	Material tests, general condition	Dimensions, general condition
Fencing, mesh, posts, gates, etc.	Coating and mechanical tests, visual inspection, dimensions	Damage, dimensions, general workmanship, galvanizing, condition of wood posts
Forgings, steel	Material tests, visual and dimensional inspection	Size, uniformity, surface defects, warping (permit no repairs).

Table 6-2.2 Inspection of Fabricated and Manufactured Materials (2 of 3)

PRODUCT	ITEMS TESTED BY METS	ITEMS TO CHECK AT JOB SITE
Girders, concrete, precast, prestressed	Material tests, stressing and fabrication inspection (forms steel placement, concrete, etc.) workmanship, dimensions, conformance to plans	Damage, workmanship, exposed steel dimensions, finish, cracks or other defects
Head gates	Material check, visual and dimensional inspection	Damage, workmanship, dimensions, type
Joints Pourable joint sealing compound Premolded expansion joint filler	Lab tests, visual check Tests of each roll, visual inspection	Proper components, proper mixing, marking. Damage, workmanship, correct movement rating (from test report), size and type, lot and batch identification (See the <i>Bridge Construction Records and Procedures Manual</i> .)
Markers, pavement	Tests of each lot, random inspection	Damage, surface defects
Mechanical equipment, scales, pumps truck inspection stations, roadside rests	Inspection usually assigned to resident engineer. Consult with the Office of Structure Design, Mechanical & Electrical Stations, for assistance if required.	Damage, installation details, workmanship
Metal crib wall	Tests, visual inspection, galvanizing, dimensions.	Dimensions, workmanship, galvanizing, specified bolts
Miscellaneous iron and steel, misc. bridge metal, bearing assemblies, rings and covers frames and grates, etc.	Sampling and testing as specified, qualification of welders, inspection of fabrication, dimensions	Damage, welding or fabrication defects, conformance to drawings, galvanizing defects, grinding specified coating.
Paint	Specified tests, markings	Lumps, hard setting, color, marking of cans adherence, surface preparation, lot numbers(same as on inspection report).
Piling Concrete Sheet (when specified as cont. item)	Material check, stressing, fabrication, workmanship Tests, dimensions, workmanship	Damage, workmanship (cracks, spalling, etc.) painting of strand ends, conformance to plans, straightness. Dimensions and workmanship
Timber	See Timber, General. Check for straightness, required, treatment	Check for straightness, required treatment, dimensions
Pipe, galvanized	Coating tests, visual and dimensional inspection	Size, uniformity, surface defects (permit no repairs)
Pipe, plastic	Material, tests, dimensions, workmanship and markings	Dimensions, workmanship, markings
Poles, lighting	Material and weld tests, visual and dimensional inspection	Dimensions, welds, workmanship, galvanizing type
Prestressing strand	Mechanical tests, wrapping, visual inspection when possible	Check strand for rust, damage, surface defects. Check tags for stressing information.

Table 6-2.2 Inspection of Fabricated and Manufactured Materials (3 of 3)

PRODUCT	ITEMS TESTED BY METS	ITEMS TO CHECK AT JOB SITE
Pull boxes (concrete)	Reinforcement, dimensions, workmanship	Cracks, rock pockets, exposed steel, dimensions
Railings, barriers Bridge railing, barrier, etc.	Material tests, welder qualifications, welding and fabrication, galvanizing	Damage to rail or galvanizing; fabrication or galvanizing defect, fit of sleeves, dimensions; types of bolts or nuts furnished
Metal beam guard rail	Material tests, fabrication, radius, dimensions, punching of holes, galvanizing, marking	Damage to rail or galvanizing; workmanship of rail and galvanizing; dimensions; conditions of holes, etc.
Railroad rail	Weight, general condition, rust	Dimensions, rust
Raised bars (precast)	Strength tests, visual inspection	Damage, surface defects, color
Sign structures	Material tests, qualification of welders, inspection during and after fabrication, dimensions, cleaning and painting or galvanizing, etc.	Damage, general workmanship, general conformance to requirements, position of sign panels, final check of electrical equipment for illuminated signs, proper nuts and bolts, properly torqued
Signs, changeable message	Fabrication, operation, workmanship	(See Section 4-56 of this manual.)
Steel, flooring and grating	Materials tests, workmanship and dimensions	Workmanship, dimensions
Structural steel	Material tests, qualifications of welders, inspection during fabrication, nondestructive testing, preparation and painting in the shop, conformance to plans and approved shop drawings, proper joint preparation for shop-bolted connections	Damage to members or paint: defects in steel or in welds; overlooked fabrication details; camber condition of paint; dimensions; condition of holes; proper bolts and nut markings; proper torquing; straightness and squareness of members
Timber, general	Visual inspection for grade and dimensions, treatment; retention and penetration; analysis of preservative; marking (See Piling, timber, also.)	Timber is usually inspected in the pile, so pieces should be inspected at the job site for damage, grade, deposits of excess preservative, etc. Some checking of dimensions also may be advisable. METS is available for advice or assistance as necessary.
Waterstop	Material tests, finish dimensions, uniformity	Finish, dimensions, uniformity
Welded steel pipe	Material tests, welder qualifications, welding inspection; and spark testing, marking, dimensions	Shipping damage, visible defects in pipe or coating marking, dimensions
Wire mesh reinforcing	Materials tests, visual inspection	Rust and broken welds